

Facebook, Zuckerberg “like” MIT

Facebook CEO touts company to packed 26-100



CHRISTOPHER A. MAYNOR—THE TECH

Facebook CEO Mark Zuckerberg speaks to the press outside Lobby 10 around noon on Monday. After fielding questions from the press, Zuckerberg addressed a packed 26-100. Zuckerberg also attended a recruiting event with MIT and Harvard students on Monday afternoon.

By Ethan A. Solomon
EDITOR IN CHIEF

Facebook co-founder and CEO Mark Zuckerberg swung by MIT yesterday to tell a packed 26-100 about Facebook's corporate culture, what it's like working in Silicon Valley, and — not surprisingly — why MIT students would make good Facebook engineers.

Zuckerberg's talk, which took the form of a moderated discussion with Chancellor Eric Grimson PhD '80 and Facebook Vice President of Engineering Mike Schroepfer, was not open to the media, but I got a ticket through the lottery process. According to Grimson, over 2,600 students signed up to win one of over 500 seats. Zuckerberg also made a brief appearance for the media outside Lobby 10 just prior to the talk (see sidebar).

Though never explicitly stated, Zuckerberg's appearance here was unambiguously a recruiting event. Zuckerberg and Schroepfer pep-

pered the conversation with praise of MIT students' entrepreneurial spirit and drew parallels between Facebook's corporate culture and that of MIT.

"You gotta love what you're doing" to be a good Facebook engineer, said Schroepfer. "We like people who like to get stuff done."

And when asked by the Chancellor as to what kind of talent the social networking company is looking for, Zuckerberg put it simply: a core Facebook value is a "focus on impact."

With a user base of 800 million, said Zuckerberg, and a relatively small number of engineers, Facebook is in a "sweet spot" where the "impact" from each engineer is high compared to other technology firms.

Working at Facebook "is the one job you don't get fired [from]

Facebook @ MIT, Page 16

Jessica Liu likes this.

Zuckerberg press conference

Before speaking to an assembly of students in 26-100 yesterday, Facebook CEO Mark Zuckerberg held a brief press conference outside Lobby 10. Much of the discussion referred to his comments at a Stanford University event last Saturday, when he said that he may have kept Facebook in Boston if he had the chance to start over.

As reported by *Time* maga-

zine, Zuckerberg said, "If you're a beginner and you don't know anything about this stuff, [Silicon Valley's] actually an excellent place to be because a lot of the stuff that you wouldn't understand how to do on your own, like I didn't, I could just get help from a lot of other people. But honestly, if I were starting

Press conference, Page 18

Why do science majors change? *Because science degrees are hard*

By Christopher Drew
THE NEW YORK TIMES

Last fall, President Barack Obama threw what was billed as the first White House Science Fair, a photo-op in the gilt-mirrored State Dining Room. He tested a steering wheel designed by middle schoolers to detect distracted driving and peeked inside a robot that plays soccer. It was meant as an inspirational moment: children, science is fun; work harder.

Politicians and educators have been wringing their hands for years over test scores showing U.S. students falling behind their counterparts in Slovenia and Singapore. How will the United States stack up against global rivals in innovation? The president and industry groups have called on colleges to graduate 10,000 more engineers a year and 100,000 new teachers with majors in STEM — science, technology, engineering and math. All the Sputnik-like urgency has put classrooms from kindergarten through 12th grade — the pipeline, as they call it — under a microscope. And there are encouraging signs, with surveys showing the number of college freshmen interested in majoring in a STEM field on the rise.

Science majors, Page 17

IN SHORT

Donate your old winter clothes at the Campus Winter Clothing Drive until Friday, Nov. 18. Items will be donated to the CASPAR emergency services center. Collection bins are in W98 lobby, 11-004 (Copy Tech), E19-432, E48-200, and N52-496.

Freshman/Alumni Summer Internship Program (F/ASIP) enrollment is now open until Dec. 19. Applications and more information can be found at <http://gecd.mit.edu/jobs/intern/explore/fasip>.

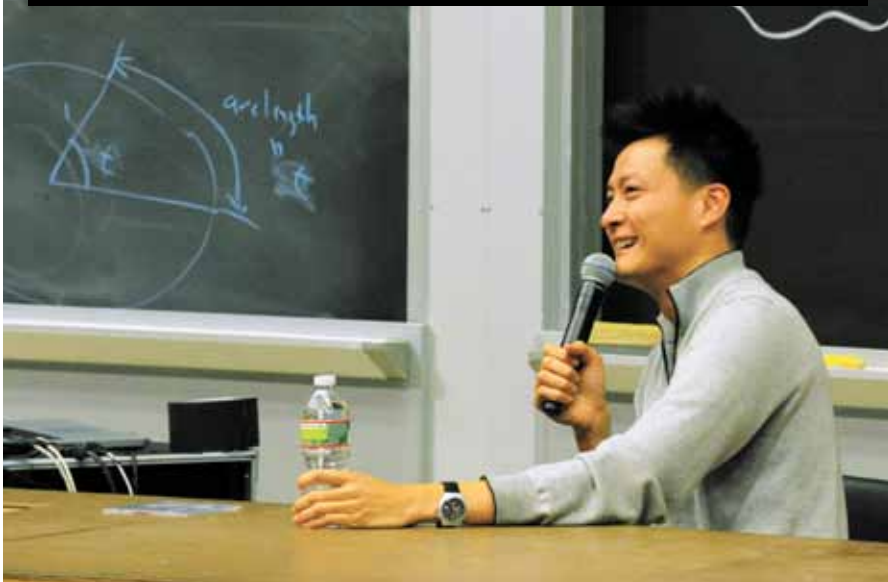
The IAP language class lottery is now open for non-study abroad subjects until Dec. 5. For more info or to enter, visit web.mit.edu/fll/www/iap.

The Tech will not be publishing this Friday. Enjoy the Veterans Day weekend!

Send news information and tips to news@tech.mit.edu.

Watch The Tech's interview with Jorge Cham

Page 9



MIT and Russia to build research university

On Oct 26, MIT signed an agreement with Russia's Skolkovo Foundation, marking the beginning of a three-year endeavor to develop a graduate research university, the Skolkovo Institute of Technology (SkTech, pronounced S-K-Tech). SkTech is located in Skolkovo, a region near Moscow that has been described as Russia's future Silicon Valley. The agreement was signed by MIT President Susan J. Hockfield, Skolkovo Foundation President Viktor Vekselberg, and SkTech founding President Edward F. Crawley '76, a Course 16 Professor.

"MIT and SkTech, working together, aim to create a new model for graduate education and research in science and technology," said Hockfield in an MIT News Office press release.

SkTech will adopt an inter-disciplinary approach to academics and research, focusing on a wide-range of fields, including energy, biomedical research, information science, space science and nuclear science. The Institute also plans to open a Center for Entrepreneurship and Innovation. Students, faculty, and researchers will work with members from other Russian and overseas universities.

The Institute, which is scheduled to open in 2014, will employ about 200 faculty members and enroll an inaugural class of 1,200 graduate students and 300 post-graduate students.

—Bruno B. F. Faviero

EASE UP ON OCCUPY WALL ST.

The protest movement isn't perfect, but what movement ever is?

OPINION, p. 4

WHAT'S WITH THE J?

Seen a large "J" around campus? CL, p. 10

SURF AND TURF

MIT service organization has an amphibious approach. CL, p. 7



INSTITUTE DOUBLE TAKE

The light at the end of the ... twisty aluminum thing. CAMPUS LIFE, p. 10

MEET THE BOSTON BALLET

The Tech sits down for a performance and interview with the Ballet. ARTS, p. 13

SECTIONS

World & Nation . . . 2
Opinion 4
Fun Pages 5
Campus Life 8
Arts 12
Sports 20

GOP talks of limiting tax breaks to reach deficit deal

WASHINGTON — Republican members of a congressional panel seeking ways to cut the federal budget deficit indicated Monday that they might allow some additional tax revenue as part of a deal with Democrats.

The Republicans met Monday to consider a proposal that would raise additional revenue by limiting some income tax deductions that primarily benefit higher-income households.

Republicans cited the proposal as evidence that they were open to ideas that would raise revenue and thus help reduce the federal budget deficit, which has exceeded \$1.2 trillion in each of the past three years.

Democrats, however, said the proposal was unlikely to lead to an agreement.

Under the proposal, Republicans would agree to limit certain itemized tax deductions in return for a permanent reduction in marginal tax rates. This would not just extend the 2001 and 2003 tax cuts but reduce the rates that apply to each additional dollar of a taxpayer's income.

—Robert Pear, *The New York Times*

On eve of election, Liberia protests turn violent

MONROVIA, Liberia — Hundreds of protesters clashed with the police and U.N. peacekeepers in the Liberian capital, Monrovia, on Monday afternoon, leaving at least one person dead the day before a presidential runoff that the opposition has vowed to boycott.

Businesses shuttered and pedestrians fled the streets as U.S. armored vehicles roared down Tubman Boulevard, Monrovia's main artery. A running battle developed outside the headquarters of the chief opposition party, pitting its supporters against peacekeepers and Liberian security forces, who fired tear gas and live rounds.

Claiming fraud in the first round of elections last month, the opposition candidate, Winston Tubman, has vowed not to take part in Tuesday's runoff against President Ellen Johnson Sirleaf, who won the Nobel Peace Prize in the midst of a heated re-election campaign.

Liberia's justice minister, Christiana Tah, said the elections would go ahead Tuesday, as scheduled. She confirmed one person dead and three injured. But at the city's Catholic Hospital, there were at least seven people injured from the clashes, five with gunshot wounds.

The presidential election is a crucial bellwether of the country's recovery from civil war, and the campaign season has been one of both triumphs and pitfalls for Johnson Sirleaf.

—Simon Akam and Emily Schmall, *The New York Times*

Wall Street bonuses are projected to drop up to 30%

By Susanne Craig
THE NEW YORK TIMES

Wall Street bonuses are set to fall by an average of 20 to 30 percent this year from a year ago, according to a closely watched compensation survey — the weakest bonus season since the financial crisis and a reflection of the leaner times confronting the industry.

Those who work in trading and investment banking — usually Wall Street's most profitable businesses, although hurting this year — will experience the sharpest drops in pay, said Alan Johnson, managing director of Johnson Associates, the firm that conducted the survey.

Employees in less volatile businesses, like asset management and commercial banking, will make about the same as they did in 2010.

And bonuses for top executives like Lloyd C. Blankfein of Goldman Sachs and Jamie Dimon of JPMorgan Chase are likely to fall sharply as well, Johnson said.

The bonus forecast will come as no surprise to many on Wall Street. Trading profits have slumped and new Dodd-Frank regulations have raised the cost of doing business. Even Goldman Sachs, a firm known for its earning power, last month reported its first quarterly loss since the financial crisis.

Goldman, Bank of America and other Wall Street firms have been cutting thousands of jobs.

"It is disappointing," Johnson said in an interview. "I think we were all hoping we were out of this morass."

This is the time of the year

when Wall Street firms start to make decisions on which bankers and traders will be rewarded for 2011.

For many of them, the year-end bonus typically represents the bulk of their compensation. The firms pay as much as 60 percent of their annual revenue in compensation, so much is at stake in how they divvy up their bonus pools.

Wall Street is "effective at knowing what it can get away with" and for months has been managing down expectations of employees about pay, said Michael J. Driscoll, a former senior trader at Bear Stearns. This year the message has been that "star performers" will get paid and the rest of Wall Street will feel the pain, he said.

"Wall Street is the process of re-evaluating what each seat is worth and having been in one of those seats it's tough," said Driscoll, now a professor at Adelphi University's business school. "Right or not, compensation is how you measure yourself and your value. You may still be making a lot, but it is a lot less than what you were making and that is what matters."

While overall compensation may be down, it is still out of sight compared with what most Americans make. Wall Street workers make a base salary of \$100,000 to \$1 million for top executives, but most of their pay comes at the end of the year in a big one-time bonus.

Employees are typically informed of their bonus in January or February, with checks going out shortly after.

In the first nine months of the

year, Goldman Sachs, Morgan Stanley, JPMorgan Chase, Bank of America and Citigroup had set aside almost \$93 billion to pay employees, up from \$91.25 billion in the year ago period, according to Johnson Associates.

The final number, however, is not set until the fourth quarter, when firms have a clear idea of their total revenue for the year.

Johnson Associates surveys as many 20 firms every year.

Big paydays came under fire during the financial crisis as lawmakers and others called for restrictions on pay. Wall Street responded by lowering pay in some instances. Firms are also issuing more incentive based compensation, a move aimed at reducing reckless risk-taking. Firms also raised base salaries of employees after receiving criticism that big bonuses also encouraged employees to take unnecessary risks.

Now, the market turmoil from Europe's debt crisis and the weak U.S. economy appear to be reining in Wall Street pay.

This year, the biggest loser will be fixed-income employees, Johnson said. This business is historically a big money maker, but profits in trading bonds, currencies and commodities have been hard to come by because of the uncertainty on global markets and economic weakness in the United States.

Goldman Sachs, one of the biggest in fixed income, made \$12.07 billion in its fixed income, currency and commodities division during the first nine months of the year, down 37 percent from levels a year ago.

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Syria unleashes assault to take an unbowed city

By Anthony Shadid
THE NEW YORK TIMES

BEIRUT — The Syrian government has launched a bloody assault to retake Homs, the country’s third-largest city, facing armed defectors who have prevented the government’s forces from seizing it as they did other restive locales this summer, in what may stand as one of the most violent episodes in an eight-month uprising.

The specter of civil war has long hung over Homs, the most tenacious and determined of cities opposed to President Bashar Assad’s rule, where the city’s Sunni Muslim majority has closed ranks behind the revolt. This month, parts of the city have become an urban battlefield, with activists saying government forces have killed 111 people in just five days, opposition groups warning of dire shortages forced by the siege and residents complaining of lawlessness by marauding soldiers and paramilitary fighters.

The strife comes as mediation

by the Arab League has apparently collapsed in one of the latest efforts to end what is among the most ferocious crackdowns on the revolts sweeping the Arab world this year. The government has increasingly demonstrated it will continue to try to stanch dissent by force, ignoring the relatively muted protests of the international community.

As important, in a country fraught with fears of a broader civil war, Homs may be emerging as an example to the rest of Syria of the relative success of fighting back against a military that, while still unified, has suffered more defections as fighting persists and more than 3,000 civilians have been killed.

“Homs is a turning point for now,” said an analyst based in Damascus who spoke on the condition of anonymity. “It’s a successful model of self-defense, if you will, at a time when you really can’t expect people to take any more. They’ve seen too many corpses come back, too many people arrested, disappeared or returned after abomi-

nable treatment. It’s too much. And everybody seems to be losing control of the street.”

Just as Hama, a city that rivals Homs in size, was retaken at the beginning of the Muslim holy month of Ramadan, violence has shaken Homs during an important Muslim holiday, Id al-Adha, which began Sunday. But Homs and its relatively unified Sunni Muslim majority have offered much more resistance than Hama and other large towns, including Deir al-Zour and Latakia, which the government stormed in August, at the onset of a shift in strategy to crush the uprising almost solely through force of arms.

On Monday, residents of Homs described harrowing scenes of abandoned streets and relentless gunfire, which sent some residents fleeing and forced others to remain indoors for fear of not being able to return to their houses. Death announcements clutter walls, residents said, testifying to the carnage in the city, which is near the Lebanese border.

Inquiry planned into US-Canada pipeline permit process

WASHINGTON — The State Department’s inspector general will conduct a special investigation of the handling of the pending decision on the proposed Keystone XL pipeline in response to reports of improper pressure on policy makers and possible conflicts of interest, according to documents released Monday.

Harold W. Geisel, the senior official in the inspector general’s office, told top agency officials in a memorandum dated Friday that he would open the review “to determine to what extent the department and all other parties involved complied with federal laws and regulations” relating to the pipeline permit process.

The internal investigation could delay the Obama administration’s decision on whether to approve the \$7 billion project, which would carry oil extracted from Canadian tar sands to refineries in Oklahoma and along the Gulf Coast. The State Department had set a deadline of year’s end to determine whether the pipeline is in the national interest, but officials suggested last week that the schedule could slip.

Objections by states along the pipeline right of way — particularly Nebraska, which is asking for a review of the proposed route — could also delay the decision for months.

—John M. Broder, *The New York Times*

Senate acts on two pieces of Obama’s jobs plan

WASHINGTON — The Senate on Monday cleared the way for a measure that would repeal a tax withholding program on government contractors and provide tax incentives for companies that hire veterans, making them the first pieces of President Barack Obama’s jobs plan to gain some momentum in Congress.

The Senate voted 94-1 to take up the bill to end a new tax withholding program on government contractors after the House easily passed the measure last month. Democrats also intend to make the Senate bill the vehicle for a package of tax breaks to spur the hiring of veterans after Obama promoted that effort Monday with the approach of Veterans Day.

These modest provisions are the only ones so far in Obama’s sweeping proposal to promote hiring that have gained support in both parties. Republicans have denounced Obama’s plan as a second stimulus package and blocked it in the Senate.

Backers of eliminating the withholding provision, which was created under President George W. Bush’s administration but delayed until 2013, say it could encourage those who do business with the government to hire more workers since they would not have to withhold 3 percent of certain payments.

—Mark Landler and Jennifer Steinhauer, *The New York Times*

GOP candidates talk tough on Iran

As U.N. inspectors prepare to unveil a new report on Iranian efforts to build nuclear weapons, some Republican presidential candidates have taken increasingly forceful tones on the issue, saying they would sanction or consider supporting an attack on Iran’s nuclear weapons program by either Israel or the United States.

The party’s hawkishness was evident last week as five major Republican rivals campaigned in Iowa. In an interview at a factory outside Des Moines, Gov. Rick Perry of Texas, asked whether he would back a pre-emptive Israeli strike on Iran’s nuclear program, told CNN he would support Israeli efforts “up to and including military action.”

Rick Santorum, the former Pennsylvania senator, at a dinner of Republican activists in Des Moines, described Iran as an “enemy.” In an interview, he said he would “stand shoulder to shoulder” in support of Israel if it launched a pre-emptive attack and that he would also back direct U.S. military support if requested by Israel.

—Richard A. Oppel Jr., *The New York Times*

Political turmoil further sinks Greece and Italy

By Rachel Donadio
THE NEW YORK TIMES

ROME — With political turmoil still plaguing Greece and descending upon the much larger economy of Italy on Monday, the fate of the euro and market stability worldwide hinged on whether two of Europe’s most tangled and unresponsive political cultures could deal with their tightening fiscal gridlock.

The prospect of a new transitional, technocratic government in Greece, and signs that Silvio Berlusconi’s resilient hold on power in Italy was weakening, did little to reassure investors that either country was prepared to grapple with the deep structural changes that investors are demanding to restore growth and reduce deficits. In both places, it is not only the economy that is on trial, but also the ability of democratic government to make highly unpopular choices.

The crisis gripping Berlusconi’s

government deepened as interest rates on the country’s debt rose Monday to more than 6.6 percent, the highest since the introduction of the euro more than a decade ago and nearing levels that have led to bailouts elsewhere. Financial markets advanced early in the day on word that the prime minister was negotiating his exit, but lost ground after he denied the reports.

In Greece, where political chaos last week threatened to plunge the eurozone into crisis, doubts remained about the capacity of the political class to form a coalition government to push through reforms it has agreed to in return for a financial lifeline. So strong is the distrust that Europe’s finance ministers refused to release the next \$11 billion in aid for Greece until the two leading political parties signed a letter affirming their commitment to meeting the conditions of the loan deal reached last month with European lenders.

Greece and Italy have famously complex political cultures, but today they are both driven by a simple dynamic: No established parties want to assume the full political cost of pushing through unpopular austerity measures and changes to the labor market. And they are jockeying for positions in a new political constellation after eventual elections — as well as for greater bargaining power with the European Union.

“It’s a big mess,” said Roberto D’Alimonte, a political science professor at Luiss Guido Carli University in Rome. “I don’t think it’s that the markets are too strong, but that democracy is weak.”

Forceful leadership also now seems to be in short supply. In Greece, Prime Minister George A. Papandreou agreed to step down to make way for a new unity government after his proposal for a referendum on the debt deal cost him support within his own Socialist coalition (and with European leaders).

WEATHER

Unseasonably warm in first half of week

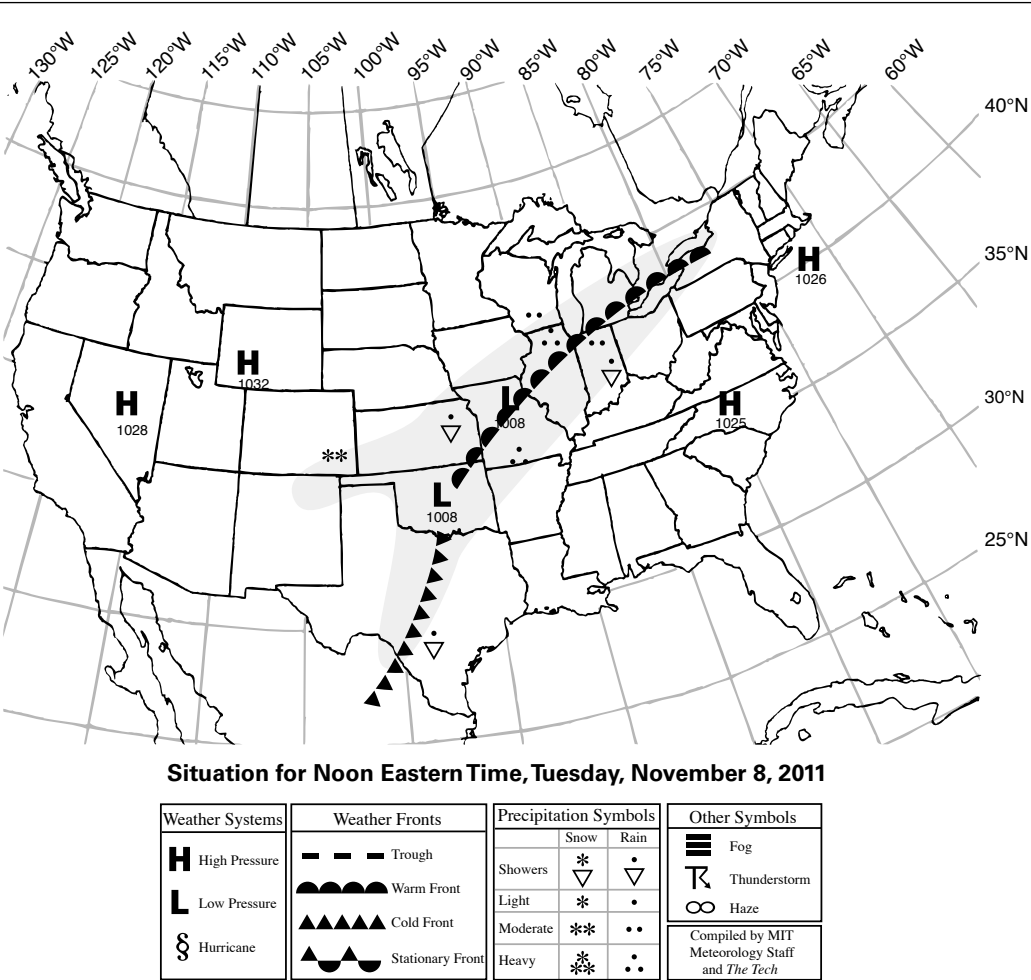
By Allison A. Wing
STAFF METEOROLOGIST

A high pressure system is in control for the first half of the week, bringing beautiful weather conditions to the Boston area. Similar to yesterday, today and tomorrow should be sunny with unseasonably warm temperatures. Normal high temperatures for this time of year are around 55°F, but we may experience temperatures over 10°F higher than that. Enjoy the

nice weather while at lasts, because a coastal low will approach the region on Thursday. With plenty of moisture associated with that system, there is a potential for heavy rain Thursday afternoon and evening. The low will exit Friday morning, with clouds dissipating as a high pressure moves in from the southwest. The temperatures on Friday will be more seasonal, as northwest winds behind the exiting low advect colder air into the region.

Extended Forecast

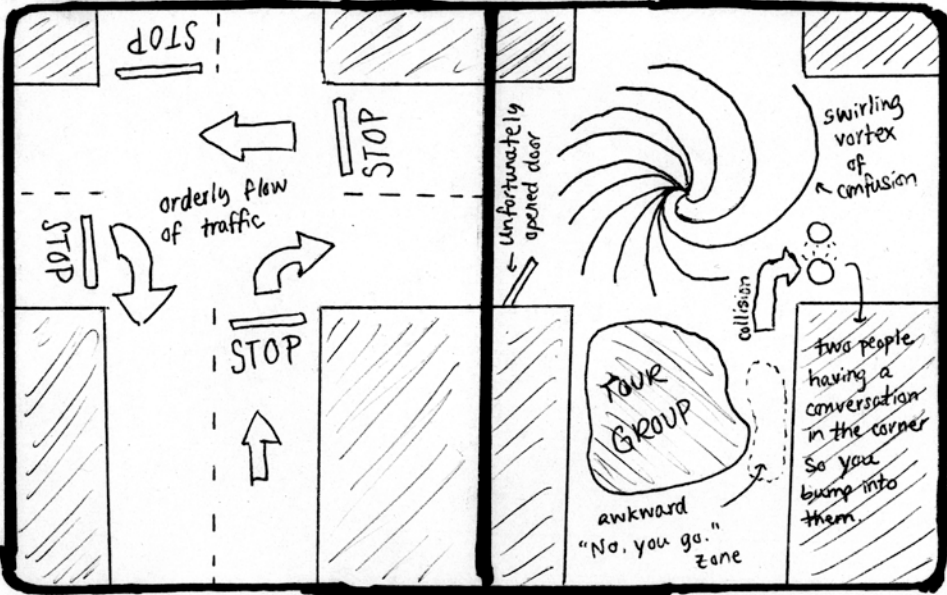
Today: Mostly sunny. High 68°F (20°C).
Tonight: Mostly clear. Low 46°F (8°C).
Tomorrow: Partly cloudy. High 64°F (18°C).
Thursday: Rain likely. High 62°F (17°C).



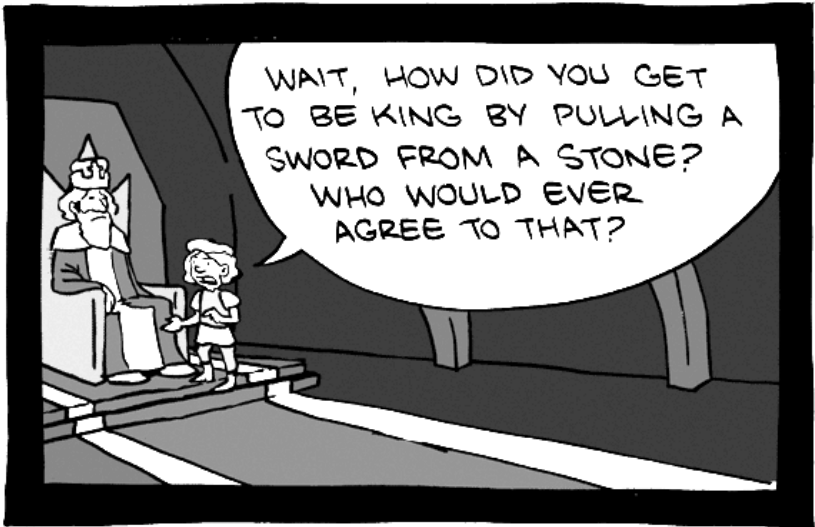


Least Action Principle

by Amanda Aparicio



How I envision the hallway to be. How the Infinite actually is.



Crossword Puzzle I

Solution, page 12

ACROSS

1 Customary practice

6 Crop of a bird

10 Model Macpherson

14 1836 siege site

15 Round dance

16 Have to have

17 "Goodbye, Mr. Chips" star

18 Way of old Rome

19 Low marks

20 Place to make a deal

23 Language suffix

24 Evening in Milano

25 Buddies

28 CSA soldier

31 Wreak havoc upon

35 Lyrical poem

36 Hollow tubes

38 Book of fiction

39 Place to make a deal

42 Turner and Holmes

43 City on the Nile

44 Altar vow

45 Music system

47 Hot tub

48 Middle of March

49 Etc.'s cousin

51 Novelist Amy

53 Place to make a deal

60 Sitarist Shankar

61 Singer Brickell

1	2	3	4	5	6	7	8	9	10	11	12	13	
14					15				16				
17					18				19				
20					21				22				
		23				24							
25	26	27			28	29	30		31		32	33	34
35				36				37		38			
39			40						41				
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			49			50			51	52			
		53	54				55	56			57	58	59
60					61				62				
63					64				65				
66					67				68				

DOWN

1 Muslim pilgrimage

2 Moises of baseball

3 Musical group

4 Mental pictures

5 Schleps

6 "Blondie" creator Young

7 Type of IRA

8 Vicinities

9 Heated tray

10 Undertaking

11 Salacious stare

12 Peggy and Pinky

13 Wynn and Begley

21 Flourish on a letter

22 "A Streetcar Named Desire" star

25 Military installations

26 Allow in

27 Sierra ____

29 Heroic saga

30 Lugosi and Bartok

32 Steer clear of

33 Crystal-lined

rock

34 Roper and Lincoln

36 Old Madrid money

37 Lose footing

40 "Anna ____"

41 Creative Muse

46 Horse operas

48 Overrun

50 Wool cloth

52 Bushy hairdos

53 Casa part

54 Bayh or Hunter

55 Comic Rudher

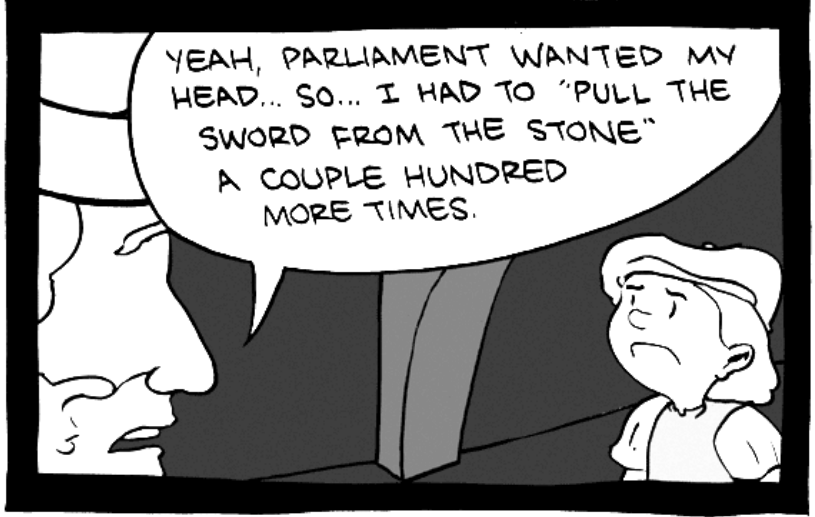
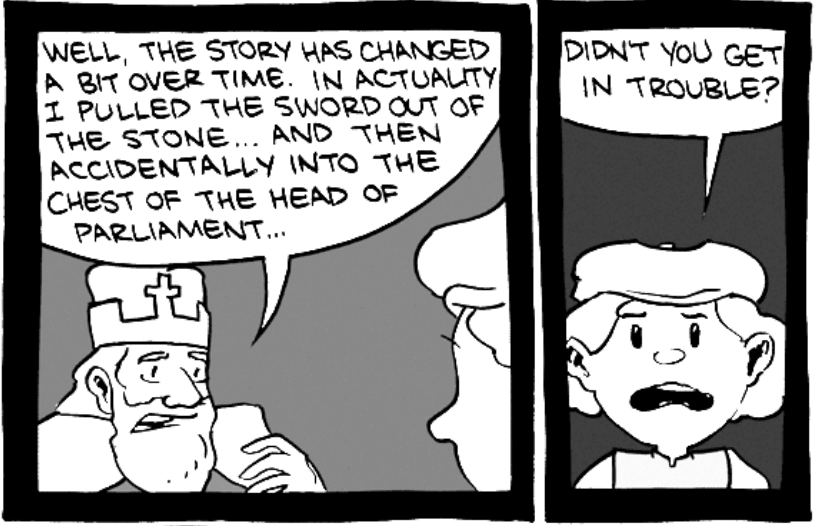
56 Ooze

57 Ingrid in "Casablanca"

58 Son of Adam

59 Former wives

60Primary color



26+			24x	12+		252x				5-	
84x	14x				41+			26+		5-	
	2÷		4-	10		4		11		6÷	
12x		110x		42x	13+		1-			2	90x
	450x		60x		12+			96x	1÷		
72x		144x		40+			1			5-	
			4-		21x		20x			24x	
30x				72x		180x				27+	
42x		8x			15+		44x	30x		5	
11÷	1÷			72x					350x		
		72x	7+		44+				90x	27+	
6x				5		462x				1	

Sudoku II

1			6	5	7	4		
	8			9		3		
			8		1		2	
6	3			8			5	
	9			7			1	3
	5		7		8			
		4		2			3	
		2	3	1	4			8

**How Well Do You
Know Your Advisor?**
Take the quiz!

-

4-5 - You know WAY too much about your Advisor.

2-3 - You Google-stalked him, didn't you?

0-1 - You have a normal relationship with your Advisor.

A vibrant, abstract pattern of interlocking yellow and orange shapes forming a tunnel-like structure that recedes into a bright white light at the center. The pattern consists of many small, irregular, teardrop-like shapes that fit together like a mosaic or a woven fabric. The colors transition from a deep orange at the edges to a bright yellow towards the center, where a large, glowing white circle represents the end of the tunnel. The overall effect is one of depth and movement, drawing the viewer's eye into the center.

the stairwell of Building 3, is a Festival of Art, Science, and (AST) installation created by graduates Craig A. Boney G, James R. Coleman G, and J. Manto G in Course 4 in April.

Aperture: <i>f/7.1</i>	Sensitivity: ISO 250
Exposure Time: 1/50 sec.	Effective Focal Length: 36 mm

The Nobel Prize discovery that left a mark on campus

I may not remember as much as I would like from 3.091 (Introduction to Solid-State Chemistry), but I do remember the big, red “J”. And no, J here does not stand for joule.

My 3.091 recitation was located in Building 36 — across the street from Building 44 — a dreary-looking building from the World War II era. I usually sat near the window, which offered a stunning view of the drab building, complemented best by overcast days. It wasn’t a terribly interesting picture, but I often ended up staring at the building’s giant J. This J was painted on a sign the size of a doorway, placed over a set of stiff black doors and a glass pane marked “CYCLOTRON” in gold letters.

I was quite curious about the J. Why J? What did it mean? I couldn't make much sense of it then. While I was curious, I apparently wasn't curious enough to search for the answer.

I learned the answer about two years later in 8.276 (Nuclear and Particle Physics). J is one of the names of a famous particle discovered by a group under MIT's Laboratory for Nuclear Science physicist Samuel C.C. Ting. The full name of the particle is the J/ψ meson, the ψ (Greek let-

The reason Ting named his discovery “J” varies by source. Some say that the J resembles the Chinese character for Ting’s last name. Others sources, like the MIT Museum’s MIT 150 Exhibit where another J is displayed, say that the previous meson discovered was named K, and J is next to K, hence the J. And finally, Ting himself said in his Nobel Lecture that “the really exciting stable particles are designated by Roman characters — like the postulated W^0 , the intermediate vector boson, the Z^0 , etc



This “J,” representing the J/ψ meson is displayed at the MIT Museum.

... [both since discovered] — whereas the ‘classical’ particles have Greek designations like q , ω , etc. This, combined with the fact that our work in the last decade had been concentrated on the electromagnetic current $j_\mu(x)$, gave us the idea to call this particle the J particle.”

Regardless of the actual origin, each explanation of the naming of the J carries its own charm.

Physicists returned to the drawing board for particle physics theory so enthusiastically that the announcement of the J/ψ meson discovery set into motion what became known as the 'November Revolution' in particle physics.



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J.M. Barrie's *Peter Pan* takes on CGI

Threesixty^o's production takes the best of film and stage on a journey to Neverland

Since J.M. Barrie's inaugural London stage production in 1905, countless iterations of *Peter Pan* have graced film and the stage. Each form has its charm; the intimacy of Wendy caring for the Lost Boys shines on the small stage, whereas the majesty of cavorting through the London Sky on the way to Neverland seems a feat best left to cinematography. All of these iterations form a collective memory of the Peter Pan story, but no one adaptation can stand alone.

This is the conundrum of producing Peter Pan, a story that sweeps vast arcs from the small to the big, from tinker bell in a jar, to Hook and the tick-tock of the giant alligator. You need to get the big things right, but you can't lose the small things too. Luckily for us, threesixty's production, playing in a giant white tent by Government Center

Presented by threesixty°

City Hall Plaza

Runs until Dec. 30, 2011

through Dec. 30, does both.

The production enjoins dramatic stagecraft with high-flying wire acrobatics, and sets both in an open circular stage enclosed by a giant screen. Think of it as seeing an Imax movie with real, live flying people in a planetarium.

Together, the experience immerses the audience in Neverland. Scenes of the London skyline fly by the audience as the actors hover in midair. The backdrop of the Neverland jungle tingles with activity — butterflies flutter in the background and the branches sway. The Cannonade from Captain Hook's pirate ship flies at the audience's faces and lands with a deafening crash. Fights between the pirates and the Lost Boys spill off the stage and into the audience. At times during the show, it's terribly easy to fall into the spell of really being in Neverland.

All of this wizardry would be moot if the story itself didn't live up to the substance of Barrie's tale of a boy who never grows up. Peter Pan is a much darker story than Disney would have you believe. It struggles between the want to eternally capture the innocence of youth whilst knowing that to live is to endure sadness, tragedy, and mortality. Anchored by strong performances from the leads — Chuck Bradley as a puck-



COURTESY OF ANDREW BRILLIANT/BRILLIANT PICTURES INC.

Tinker Bell (Emily Yetter) and Peter Pan (Chuck Bradley) fly to Neverland in the new threesixty° stage production of J.M. Barrie's *Peter Pan*.

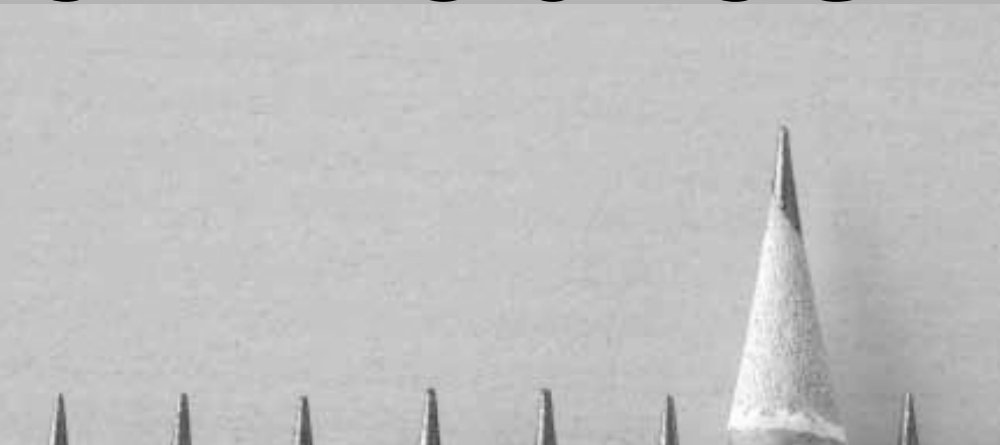
ish Peter and Evelyn Hoskins as an empathetic Wendy — the cast ably delivers on a tricky script that sometimes wanders, but ultimately flies true.

Threesixty's production of *Peter Pan* is a blockbuster production with carefully cho-

reographed flying scenes, vivid imagery, and an epic scale and grandeur. But like the best blockbusters, those things by themselves are not enough. This *Peter Pan* soars because it stays true to the story of a little orphan boy who refused to grow up.

Distinguish Yourself

as a
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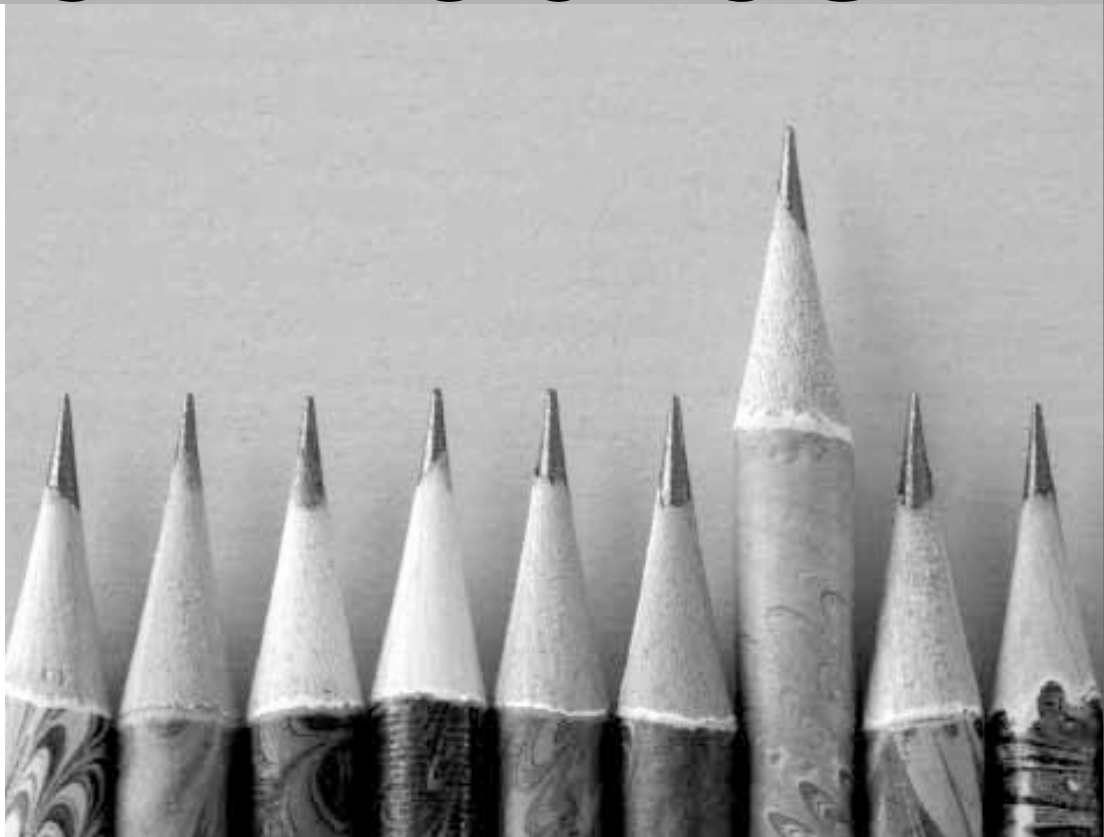
A black and white photograph showing a row of sharpened pencils. Most pencils are short and their tips are just visible at the bottom. One pencil in the center is much taller, standing out prominently from the rest, which visually represents the concept of 'distinguishing yourself' mentioned in the text above.

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Solution to Techdoku I

1	5	3	2	6	7	4
2	6	4	3	7	1	5
6	3	1	7	4	5	2
7	4	2	1	5	6	3
4	1	6	5	2	3	7
5	2	7	6	3	4	1
3	7	5	4	1	2	6

Solution to Sudoku I

from page 6

5	9	7	8	4	6	3	1	2
8	1	4	2	5	3	7	6	9
2	3	6	7	1	9	8	5	4
3	6	9	5	7	2	1	4	8
4	2	1	9	3	8	6	7	5
7	5	8	4	6	1	9	2	3
6	7	5	3	8	4	2	9	1
1	8	2	6	9	5	4	3	7
9	4	3	1	2	7	5	8	6

Solution to Crossword I

from page 5

H	A	B	I	T		C	R	A	W		E	L	L	E
A	L	A	M	O		H	O	R	A		N	E	E	D
D	O	N	A	T		I	T	E	R		D	E	E	S
J	U	D	G	E	S	C	H	A	M	B	E	R	S	
			E	S	E		S	E	R	A				
P	A	L	S		R	E	B		R	A	V	A	G	E
O	D	E	P	I	P	E	S			N	O	V	E	L
S	M	O	K	E	F	I	L	L	E	D	R	O	O	M
T	I	N	A	S		C	A	I	R	O		J	D	O
S	T	E	R	E	O		S	P	A		I	D	E	S
			E	T	A	L			T	A	N			
		S	E	N	A	T	O	R	S	O		F	F	I
R	A	V	I		E	D	I	E		R	E	L	A	X
E	L	A	N		R	E	T	E		O	S	S	I	E
N	A	N	A		S	N	A	P		S	T	A	N	S

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BALLET REVIEW

Elegance in anguish

Boston Ballet’s *Romeo and Juliet* is a captivating retelling of Shakespeare’s tragedy

By Angelique Nehmzow and Grace Young

The curtains rise and we see a young girl teasing her nurse, pushing her this way and that, pulling at her dress, running circles around her. The girl turns shy when her mother walks in, but then can barely contain her excitement when she is given a lovely new dress to wear to her first big party.

Boston Ballet’s presentation of *Romeo and Juliet* is a powerful and sensitive telling of the familiar Shakespearean tale. To render the tragic story, this production beautifully combines Sergei Prokofiev’s score with John Cranko’s choreography and sumptuous costumes with impressive lighting and sets.

Set in 15th-century Verona, Italy, the plot follows the forbidden love between the daughter of Lord Capulet and the son of Lord Montague, whose families are bitter rivals. Juliet is betrothed to Count Paris, but falls in love with Romeo at a party and then secretly marries him. All would be well if the story ended there, but Juliet’s cousin Tybalt looks to quarrel with Romeo. Romeo refuses to duel, so his friend Mercutio takes his stead and is killed when Romeo tries to intervene. In remorse, Romeo then fights Tybalt, takes his life, and is banished from the city. Before he goes, however, he spends his final night with Juliet.

The following morning, when Juliet learns that she is to marry Count Paris the next day, she enlists Friar Laurence, who previously wed her and Romeo, to help her out of her predicament. To buy her time, he gives her a concoction, which makes her fall unconscious and appear dead. He sends a letter to Romeo, telling him this deathlike state is only temporary, but the letter is never received. Believing his true love dead, Romeo rushes to Juliet’s tomb and kills himself in his grief. Awakening with Romeo dead beside her, Juliet follows suit.

It is striking how a story filled with so much violence and anguish can be told through an art form as delicate and graceful as ballet. Yet this is skillfully achieved, as the elegance of the dancers’ movements complements the passion and energy of the characters they portray. One particularly memorable scene is the masked ball, where

Romeo and Juliet
Boston Ballet Company
November 3–13, 2011
Boston Opera House

dancers, resplendent in gilded head-dresses and glitzy masks, with gold peeking from their flowing robes, waltz to Prokofiev’s imperious music. In this scene, the lovers first set eyes on one another and we clearly see Juliet drawn away from her betrothed towards Romeo, her petite figure balanced delicately on tiptoes, her feet moving like the fluttering of eyelashes.

In another poignant scene, Romeo goes to Juliet’s balcony in the moonlight to declare his love. Before leaving, he hangs on her balcony and pulls himself up to kiss her through the stone railings. Later, as the events take a graver turn, Juliet drinks Friar Laurence’s elixir and drags herself onto her bed, her outstretched hand trembling wretchedly.

As the curtains lower, you are left a little mournful, a little startled, and in awe.

Surprisingly, the deaths of Mercutio and Tybalt, killed amidst a crowd of villagers during their duel, are more dramatically depicted than those of the lovers. In other versions of the ballet, the deaths of the two lovers overwhelm the third act, with Romeo prolonging a dance with Juliet’s limp body. In this version, the ending is so brief that the audience feels jolted by the swiftness of the dancer’s actions. The lovers die together in a few graceful movements, leaving the stage absolutely still.

As the curtains lower, you are left a little mournful, a little startled, and in awe of the tumult of emotion expertly conveyed by the company’s dancers. As the lights turn up in the opera house, it feels as if you’ve just put down a great book or finished an epic movie. It makes for a rich evening of entertainment, and a refreshing getaway from campus bustle to romantic and tense 15th-century Verona.

INTERVIEW

Sylvia Deaton

The Tech talks with Boston Ballet dancer

By Angelique Nehmzow
STAFF WRITER

Sylvia Deaton, 20, has been dancing since she could walk, and knew she wanted to be a professional dancer from a very young age. At age six, she began taking ballet, jazz and tap classes, and was soon participating in dance competitions and winning regional and national titles. She was inspired by Broadway shows and local ballet performances her family would bring her to, and would practice the moves at home, using her sister as a male partner and rows of stuffed animals as her audience.

She dreamed of performing for a packed house, and when she was 14 she moved to Boston to be a scholarship student in Boston Ballet School’s Trainee Program. Thereafter, she was a member of Boston Ballet II, Boston Ballet’s apprentice program; last year was her first year in the corps de ballet with the main company. She has had the opportunity to travel with the company, and last year she performed on an open-air stage in the gardens of the palatial Alhambra in Granada, Spain.

Deaton, from Salvisa, Ky., spoke to *The Tech* about being a dancer and her experiences performing with the Boston Ballet Company. Deaton is currently working on *Romeo and Juliet*.

The Tech: What do you enjoy most about dancing?

Sylvia Deaton: Performing! I live to be onstage! Nothing brings me more joy than the adrenaline before a show and the satisfaction of hearing the audience’s reaction. I feel invincible onstage and my single hope is that the audience can live vicariously through my performance and feel the same way.

TT: What do you find to be

the most difficult aspect of being a dancer?

SD: The most difficult aspect of being a dancer is the maintenance I have to allow my body. As my instrument, I have to treat my body with great care. Like any athlete, I deal with aches, pains, and sore muscles daily. Luckily, here at Boston Ballet we have an incredible team of physical therapists who take extremely good care of us. I also stick my feet and calves in a bucket of ice and take a bath in Epsom salt every night so I feel ready to work the next morning.

TT: What is your favorite ballet? That you have performed in and/or otherwise.

SD: I love them all! However, the piece I found most challenging and rewarding was *Falling Angels* by Jiri Kylián. It is set to Steve Reich’s “Drumming Pt. 1” and must be counted from the very beginning. If one person loses count it is very obvious. One of the most physically demanding pieces I’ve done, it takes a lot of strength in the legs for the grounded energetic movement.

TT: What is your role in *Romeo and Juliet*? What do you like or dislike about the role?

SD: One of the things I love about this show is the versatility of roles I perform. I go from an angry housewife scolding my husband in scene one, to an elegant ball guest, to a goofy clown in the second market, to an eager and excited bridesmaid bringing lilies to Juliet for her wedding. I love all my roles because each allows me to be someone different.

TT: How do you learn the dances? How much do you practice, and how far in advance before the premiere?

SD: Boston Ballet brings in individuals known as staggers to set our productions. They teach us the choreography and we practice the material for

around two to three months in advance. We rehearse six hours a day Monday through Friday. Throughout the workday, we have designated hours to rehearse different scenes within the production. The principals and soloists rehearse variations and pas de deux separately and the corps de ballet rehearses the group scenes. Closer to the premiere, we put everything together in combined rehearsals. The week before opening night we move to the opera house for technical and dress rehearsals.

TT: What is your favorite scene in the production and why?

SD: My favorite moment is during the death scene at the end of the ballet. After Romeo has stabbed himself thinking Juliet as dead, Juliet wakes from her sleeping potion. The combination of seeing her begin to breath and hearing the heart-wrenching Prokofiev music sends chills down my spine and I cry at every show without fail.

TT: Do you have a dancer you admire most?

SD: I have profound admiration for my fellow artists and artistic staff at Boston Ballet. Their integrity and passion for this art form is inspiring. I learn new things from them everyday and to be in each of their presence is a true honor.

TT: What do you think you might go on to do after your dancing career?

SD: The age at which dancers retire varies from person to person. I hope I will have a long, healthy dancing career. However, after I retire I will still work in a dance-related field. I’m interested in teaching and community outreach programs. To be given the gift of dance from birth, I feel it is my mission to share its beauty with the next generation of young artists.

Solution to Techdoku 9000

from page 8

10	11	5	12	1	8	7	3	2	6	9	4
12	1	7	2	3	10	9	5	4	8	11	6
7	8	2	9	10	5	4	12	11	3	6	1
3	4	10	5	6	1	12	8	7	11	2	9
4	5	11	6	7	2	1	9	8	12	3	10
8	9	3	10	11	6	5	1	12	4	7	2
9	10	4	11	12	7	6	2	1	5	8	3
5	6	12	7	8	3	2	10	9	1	4	11
6	7	1	8	9	4	3	11	10	2	5	12
11	12	6	1	2	9	8	4	3	7	10	5
1	2	8	3	4	11	10	6	5	9	12	7
2	3	9	4	5	12	11	7	6	10	1	8



SMBC, from page 5

Solution to Sudoku II

from page 8

1	2	3	6	5	7	4	8	9
5	8	6	4	9	2	3	7	1
7	4	9	8	3	1	6	2	5
6	3	7	1	8	9	2	5	4
2	1	8	5	4	3	7	9	6
4	9	5	2	7	6	8	1	3
3	5	1	7	6	8	9	4	2
8	6	4	9	2	5	1	3	7
9	7	2	3	1	4	5	6	8

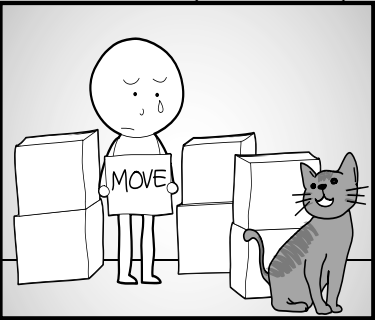
Solution to Crossword II

from page 6

C	H	A	W	S	B	O	R	N	C	O	P	E
H	I	R	E	E	O	R	E	O	U	N	U	M
E	L	I	A	N	R	A	I	N	D	R	O	P
F	O	L	K	S	T	O	L	D	M	E	I	
					L	E	A	N		E	P	O
R	A	G	I	N	G	O	N	T	O		R	O
E	G	A	N			A	L	I	A	S	E	L
W	A	S	G	U	L	L	I	B	L	E	A	N
O	S	H		L	O	I	N	S		U	N	I
V	S	O		S	I	T	S		T	O	D	A
E	I	G	H	T	S		T	O	N	I		
					B	E	L	I	E	V	E	D
E	L	D	O	R	A	D	O	S		E	I	E
F	I	R	M		N	E	N	E		C	O	R
F	L	U	B		E	A	S			K	N	E

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Hackers hung a banner on the inside of Lobby 7 commemorating the fifth of November. The Latin is five words beginning with the letter V, meaning, “By the power of truth, I, while living, have conquered the universe” — a reference to the movie *V for Vendetta*.



Hackers placed a Guy Fawkes mask, worn by the character V from *V for Vendetta*, over the blank face of the *Alchemist* statue early Saturday morning. The fifth of November is commemorated in Britain for the failure of the Gunpowder Plot led by Guy Fawkes to blow up Parliament, but took on a new meaning of anti-tyranny in the movie and comic.

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ERIN BAILIE

Marisa B. Fryer '15 attempts to run through WPI's defensive line during last Saturday's New England Women's Collegiate Rugby Conference game against WPI. The Engineers entered the NEWCRC playoffs last week as the fifth seed and played through the snow to defeat Babson, leading them to Saturday's 24-17 win over WPI.

The brothers of
Lambda Chi Alpha
congratulate their neighbor,
Adam Riess,
Phi Delta Theta '92,
for winning the
**2011 Nobel Prize
in Physics**

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Facebook, eventually, will expand beyond West

Zuckerberg addresses recent comments at Stanford about startup culture in the Valley

Facebook @ MIT, from Page 1

for using Facebook all day,” joked Schroepfer.

Facebook in Boston?

Facebook’s tour through Cambridge — Zuckerberg also visited Harvard yesterday (his first time back to the college since dropping out) — has fueled media speculation over a Facebook expansion to the East Coast. A little over a week ago, Zuckerberg mentioned in an interview with Startup School’s Jessica Livingston that if he were starting Facebook now, he may have chosen to stay in Boston.

At the MIT event yesterday (and in his Lobby 10 press conference), Zuckerberg clarified those remarks, saying that “I don’t think I could have kept Facebook running out here,” but that Boston and Silicon Valley each have their ups and downs from an entrepreneurial perspective. For example, he said, Silicon Valley businesses share many common philosophies, which can be helpful to new startups but might hinder innovative approaches.

“Silicon Valley thinks certain things as a community,” he said. “It’s like one big organization, in a way.”

But, he added, Boston could be just as good a place to start a company. And during Facebook’s transition to California, the company still felt like Boston.

“For a while we did not feel at home in the Silicon Valley community,” said Zuckerberg, saying that Facebook initially drew heavily on Harvard alums (and faculty) to power its Palo Alto operation.

Zuckerberg and Schroepfer did not rule out the possibility that Facebook could open a Boston or

New York office, but offered no immediate plans.

“It’s inevitable that we will expand to other geographies — East Coast of the U.S., Europe, and others,” suggested Schroepfer. But for the time being, Facebook plans on learning from its experience opening a new office in Seattle, said Zuckerberg. He also cited the time shift and travel time as a hindrance to immediate Facebook expansion beyond the West Coast.

Privacy and security

Grimson also asked the Facebook team about their often-controversial privacy and security policies. In the past, users have alleged that Facebook’s privacy policies are difficult to understand and make too much information public.

The team noted that Facebook gives users control over what information they share and who they share it with, but that users with little or no computer and internet experience may not understand how to protect their information.

“This is a challenge when people don’t understand the rules of the game up-front,” said Schroepfer.

Zuckerberg added that with the imminent release of Facebook’s new Timeline format, users will be able to easily “go back in time” and change the privacy settings on any post, sharing it only with the people they want to.

Facebook has also changed broader conceptions about privacy, said Zuckerberg.

“People embrace mistakes nowadays thanks to Facebook,” he said, suggesting that public but personal information means people will try less and less to cover up their past.

Zuckerberg hinted, albeit briefly,

at where Facebook might be going in the next few years. Media — like books, news, music, movies, and TV — said Zuckerberg, might be the next place to foster social connections online, like Facebook has already tried with games. The CEO suggested that Facebook’s integration with Spotify — a streaming mu-

sic platform — will increase soon.

In a question-and-answer session with the audience, Zuckerberg said that social media’s impact on society was diverse.

“I personally don’t think social media had as big of a role as people say,” for movements like the Arab Spring, he noted. People in the Mid-

dle East wanted change, he said, and that is what has driven recent revolutions in Tunisia, Egypt, and Libya.

But, he added, social media has profoundly empowered individuals, who can now broadcast information and opinions without needing large-scale media organizations.



NICHOLAS CHORNAY—THE TECH

Zuckerberg (and occasionally Schroepfer) answered a variety of questions covering topics ranging from online privacy to Facebook’s addictiveness — the latter of which Zuckerberg attributed to a combination of human social instinct and applied machine learning.



KAILIANG CHEN

Zuckerberg speaks to the press prior to his appearance in 26-100. Over 2,600 students entered the ticket lottery to see Zuckerberg speak.



DAVID DA HE—THE TECH

Eric Grimson PhD ’80, Facebook CEO Mark Zuckerberg, and Facebook Vice President of Engineering Mike Schroepfer.



DAVID DA HE—THE TECH

After an hour-long discussion with Chancellor Eric Grimson PhD ’80, Facebook CEO Mark Zuckerberg takes questions from the audience in 26-100.



NICHOLAS CHORNAY—THE TECH

Zuckerberg, a Harvard dropout, graciously accepts an MIT hoodie from Chancellor Grimson at the end of the discussion.



DAVID DA HE—THE TECH

Facebook Director of Engineering Jocelyn Goldfein awaits Mark Zuckerberg’s arrival in 26-100.

Math and science majors have highest attrition

High competition at top schools discourage students from completing science degree

Science majors, from Page 1

But, it turns out, middle and high school students are having most of the fun, building their erector sets and dropping eggs into water to test the first law of motion. The excitement quickly fades as students brush up against the reality of what David E. Goldberg, an emeritus engineering professor, calls “the math-science death march.” Freshmen in college wade through a blizzard of calculus, physics and chemistry in lecture halls with hundreds of other students. And then many wash out.

Studies have found that roughly 40 percent of students planning engineering and science majors end up switching to other subjects or failing to get any degree. That increases to as much as 60 percent when pre-medical students, who typically have the strongest SAT scores and high school science preparation, are included, according to new data from the University of California at Los Angeles. That is twice the combined attrition rate of all other majors.

For educators, the big question is how to keep the momentum being built in the lower grades from dissipating once the students get to college.

“We’re losing an alarming proportion of our nation’s science talent once the students get to college,” says Mitchell J. Chang, an education professor at UCLA who has studied the matter. “It’s not just a K-12 preparation issue.”

Chang says that rather than losing mainly students from disadvantaged backgrounds or those with lackluster records, the attrition rate can be higher at the most selective schools, where he believes the competition overwhelms even well-qualified students.

“You’d like to think that since these institutions are getting the best students, the students who go there would have the best chances to succeed,” he says. “But if you take two students who have the same high school grade-point average and SAT scores, and you put one in a highly selective school like Berkeley and the other in a school with lower average scores like Cal State, that Berkeley student is at least 13 percent less likely than the one at Cal State to finish a STEM degree.”

The bulk of attrition comes in engineering and among premed majors, who typically leave STEM fields if their hopes for medical school fade. There is no doubt that the main majors are difficult and growing more complex. Some students still lack math preparation or aren’t willing to work hard enough.

Other deterrents are the tough freshman classes, typically followed by two years of fairly abstract courses leading to a senior research or design project. “It’s dry and hard to get through, so if you can create an oasis in there, it would be a good thing,” says Goldberg, who retired last year as an engineering professor at the University of Illinois at Urbana-Champaign and is now an education consultant. He thinks the president’s chances of getting his 10,000 engineers is “essentially nil.”

About 40% of those who plan to study engineering or science switch to other fields.

In September, the Association of American Universities, which represents 61 of the largest research institutions, announced a five-year initiative to encourage faculty members in the STEM fields to use more interactive teaching techniques.

“There is a long way to go,” says Hunter R. Rawlings, the association’s president, “and there is an ur-

gent need to accelerate the process of reform.”

The latest research also suggests that there could be more subtle problems at work, like the proliferation of grade inflation in the humanities and social sciences, which provides another incentive for students to leave STEM majors. It is no surprise that grades are lower in math and science, where the answers are clear-cut and there are no bonus points for flair. Professors also say they are strict because science and engineering courses build on one another, and a student who fails to absorb the key lessons in

No one doubts that students need a strong theoretical foundation. But what frustrates education experts is how long it has taken for most schools to make changes.

one class will flounder in the next.

After studying nearly a decade of transcripts at one college, Kevin Rask, a professor at Wake Forest University, concluded last year that the grades in the introductory math and science classes were among the lowest on campus. The chemistry department gave the lowest grades overall, averaging 2.78 out of 4, followed by mathematics at 2.90. Education, language and English courses had the highest averages, ranging from 3.33 to 3.36.

Ben Ost, a doctoral student at Cornell, found in a similar study that STEM students are both “pulled away” by high grades in their courses in other fields and “pushed out” by lower grades in their majors.

The latest research also suggests that there could be more subtle problems at work.

Matthew Moniz bailed out of engineering at Notre Dame in the fall of his sophomore year. He had been the kind of recruit most engineering departments dream about. He had scored an 800 in math on the SAT and in the 700s in both reading and writing. He also had taken Calculus BC and five other Advanced Placement courses at a prep school in Washington, D.C., and had long planned to major in engineering.

But as Moniz sat in his mechanics class in 2009, he realized he had already had enough. “I was trying to memorize equations, and engineering’s all about the application, which they really didn’t teach too well,” he says. “It was just like, ‘Do these practice problems, then you’re on your own.’” And as he looked ahead at the curriculum, he did not see much relief on the horizon.

So Moniz, a 21-year-old who likes poetry and had enjoyed introductory psychology, switched to a double major in psychology and English, where the classes are “a lot more discussion based.” He will graduate in May and plans to be a clinical psychologist. Of his four freshman buddies at Notre Dame, one switched to business, another to music. One of the two who is still in engineering plans to work in finance after graduation.

Moniz’s experience illustrates how some of the best-prepared students find engineering education too narrow and lacking the passion of other fields. They also see easier ways to make money.

Notre Dame’s engineering dean, Peter Kilpatrick, will be the first to concede that sophomore and junior years, which focus mainly on theory, remain a “weak link” in technical education. He says his engineering school has gradually improved its retention rate over the past decade by creating design

projects for freshmen and breaking “a deadly lecture” for 400 students into groups of 80. Only 50 to 55 percent of the school’s students stayed through graduation 10 years ago. But that figure now tops 75 percent, he says, and efforts to create more labs in the middle years could help raise it further.

“We’re two years into that experiment and, quite honestly, it’s probably going to take five to 10 years before we’re really able to inflesh the whole curriculum with this project-based learning,” Kilpatrick said.

No one doubts that students

need a strong theoretical foundation. But what frustrates education experts is how long it has taken for most schools to make changes.

The National Science Board, a public advisory body, warned in the mid-1980s that students were losing sight of why they wanted to be scientists and engineers in the first place. Research confirmed in the 1990s that students learn more by grappling with open-ended problems, like creating a computer game or designing an alternative energy system, than listening to lectures. While the National Science Foundation went on to finance pilot courses that employed interactive projects, when the money dried up, so did most of the courses. Lecture classes are far cheaper to produce, and top professors are focused on bringing in research grants, not teaching undergraduates.

In 2005, the National Academy of Engineering concluded that “scattered interventions” had not resulted in widespread change. “Treating the freshman year as a ‘sink or swim’ experience and accepting attrition as inevitable,” it said, “is both unfair to students and wasteful of resources and faculty time.”

Since becoming Notre Dame’s dean in 2008, Kilpatrick has revamped and expanded a freshman design course that had gotten “a little bit stale.” The students now do four projects. They build Lego robots and design bridges capable of carrying heavy loads at minimal cost. They also create electronic circuit boards and dream up a project of their own.

“They learn how to work with their hands, how to program the robot and how to work with design constraints,” he says. But he also says it’s inevitable that students will be lost. Some new students do not have a good feel for how deeply technical engineering is. Other bright students may have breezed through high school without developing disciplined habits. By contrast, students in China and India focus relentlessly on math and science from an early age.

“We’re in a worldwide competition, and we’ve got to retain as many of our students as we can,” Kilpatrick said. “But we’re not doing kids a favor if we’re not teaching them good life and study skills.”

Worcester Polytechnic Institute, in Massachusetts, one of the nation’s oldest technological schools, has taken the idea of science-oriented projects to heart. While it still expects students to push their way through standard engineering and science classes, it ripped up its traditional curriculum in the 1970s to make room for extensive research, design and social-service projects by juniors and seniors, including many conducted on trips with professors overseas. In 2007, it added optional first-year projects — which a quarter of its freshmen do — fo-

cused on world problems like hunger or disease.

“That kind of early engagement, and letting them see they can work on something that is interesting and important, is a big deal,” says Arthur C. Heinricher, the dean of undergraduate studies. “That hooks students.”

And so late this past summer, about 90 freshmen received emails asking if they typically received flu vaccines. The emails were not from the health services office, but from students measuring how widely flu spreads at different rates of vaccination. Two of the students had spent part of their freshman year researching diseases and devising a survey. Now, as juniors, they were recruiting the newcomers to take part in simulations, using neon wristbands and stickers, to track how many of them became “infected” as they mingled during orientation.

Brenna Pugliese, one of the juniors and a biology major, says the two-day exercise raised awareness on campus of the need for more students to get the vaccine. “I can honestly say that I learned more about various biology topics than I ever learned in any other class,” she says.

Teachers say they have been surprised by the sophistication of some of the freshmen projects, like a device to harvest kinetic energy that is now being patented. But the main goals are to enable students to work closely with faculty members, build confidence and promote teamwork. Studies have shown that women, in particular, want to see that their schoolwork is connected to helping people, and the projects help them feel more comfortable in STEM fields, where men far outnumber women everywhere except in biology.

Seventy-four percent of WPI undergraduates earn bachelor’s degrees within four years and 80 percent by six years.

Most of the top state research universities have added at least a splash of design work in the freshman year.

The University of Illinois began this fall to require freshmen engineering students to take a course on aspirations for the profession and encourages them to do a design project or take a leadership seminar. Most technical schools push students to seek summer internships and take semesters off to gain practical work experiences. The hope is that the lure of high-paying jobs during an economic downturn will convince more students to stick with it.

Most top state research universities have added at least a splash of design work for freshmen .

Some private schools have also adjusted their grading policies to ease some of the pressure on STEM students. The Massachusetts Institute of Technology has long given freshmen only “pass” or “no record” grades in the first half of the year while they get used to the workload. WPI lets undergraduates take up to three classes for which no grade is recorded if they would have received less than a C. Any required courses would have to be repeated.

Ilea Graedel, a 20-year-old junior in aerospace engineering, says that policy provides “a nice buffer if you want to try something new, like a class outside your comfort zone.”

But what really helps Graedel get through the rigors of STEM, she says, is hanging onto her aspirations. She grew up in a farming area in Washington State, and is the only student from her high school class of 26 pursuing a technology degree. She has wanted to be an astronaut since she was three, when her mother took her to Boeing’s Museum of Flight in Seattle and bought her a book called “I Want to Be an Astronaut.”

The space program has been sharply cut back. Still, she says, “I’m going to hold onto that dream very dearly.”

EVENTS

NOV. 8 – NOV. 14

TUESDAY

(7:00 p.m. – 9:00 p.m.) Wall Street in Context: Strategies for restoring the dignity of the 99% — 32-123

(7:00 p.m. – 12:00 a.m.) Film Screening: *Miguel and William* — discussion with director Ines Paris follows — 32-141

WEDNESDAY

(5:30 p.m. – 8:00 p.m.) Innovation Series Event: Changing the World: How Innovators are Using the Web for Social Action — 32-123

(6:00 p.m. – 7:30 p.m.) Life in the Universe: In the Beginning, MIT Museum talk — N51

THURSDAY

(5:00 p.m. – 7:00 p.m.) MIT Communications Forum: Cities and the Future of Entertainment — E10-070

(6:00 p.m. – 7:00 p.m.) Energy Discussions: Desalination — 4-153

FRIDAY

(7:00 p.m. – 9:00 p.m.) Otto Piene Film/Video Screening — E15

(9:15 p.m. – 10:00 p.m.) Potluck Shorts: Art of Love (Boston Asian American Film Festival Shorts Program)

SATURDAY

(7:30 p.m. – 10:00 p.m.) Bang on a Can All-Stars — W16

SUNDAY

(3:00 p.m. – 5:00 p.m.) Origamido Workshop, seminar on handmade paper

(4:00 p.m. – 6:00 p.m.) MITHAS Concert — Wong Auditorium

MONDAY

(5:00 p.m. – 6:30 p.m.) Lecture: “Unlocking Energy Innovation” by Prof. Richard Lester PhD ’80 — 66-110

(7:30 p.m. – 9:00 p.m.) Jeff Warner, Music from Appalachia — 14W-111

Send your campus events to events@tech.mit.edu.



An excited Hiawatha Bray, reporter for the *Boston Globe*, tries to ask Zuckerberg questions during the press event on Monday.

CHRISTOPHER A. MAYNOR—THE TECH

Press conference, from Page 1

now, I just would have stayed in Boston, I think.”

Seven years after co-founding the multibillion dollar company, Zuckerberg told the Stanford audience that Silicon Valley’s short attention span “bothers” him.

On the other hand, companies outside of the startup hub show more of a “longer-term cadence,” according to the 27-year-old CEO.

Back in 2004, it was his lack of experience that pushed Zuckerberg to the West Coast. In yesterday’s press conference at MIT, Zuckerberg said he had wanted to work with people who had experience building companies.

Still, he stressed that entrepreneurs, especially engineers, should not feel pressured to start in Silicon Valley.

“Often, I think a lot of people move out to Silicon Valley because that’s where they have to be, but there are so many smart people out here at MIT and Harvard and other universities that you could

start a company here, you could start a company in New York, you could start it in any country you want.”

“If [entrepreneurs] can find the financing and the engineering talent out here that they need, which I think exists, then a lot of people would be willing to stay for a while.”

Zuckerberg referred to Dropbox as an example of another successful company started in Cambridge by students. Dropbox was co-founded in 2007 by Andrew W. Houston ’06, a Course VI major, and Arash Ferdowsi ’08 when emails and USB flash drives proved to be inefficient for file-sharing.

Finally, Zuckerberg addressed a question on cyberbullying, describing it as an “unfortunate thing online that we work really hard to prevent.” Facebook’s solutions, such as encouraging users to report abuse, are “social,” Zuckerberg said, “just like a lot of the other dynamics on the site.”

—Maggie Lloyd

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More than \$600 million missing from MF Global

Derivatives broker collapses, regulator faces biggest test with leader on the sidelines

By Ben Protess and Azam Ahmed
THE NEW YORK TIMES

A few days before MF Global’s collapse, regulators stationed at the firm were assured its books were in order.

Their boss, Gary Gensler, was not convinced. A former Goldman Sachs partner who once passed the test for certified public accountants, he bore into the numbers himself and grew uneasy with the firm’s finances.

“Keep pressing them,” he told his regulators, according to people with direct knowledge of the conversation.

Within days, his suspicions were confirmed. More than \$600 million in customer money was missing from MF Global, prompting an investigation by Gensler’s Commodity Futures Trading Commission.

As the regulator intensifies its inquiry into MF Global and the firm’s former leader, Jon S. Corzine, the agency must do without its hard-charging chairman. Late last week, Gensler stepped away from the investigation amid questions over his relationship to Corzine, his former boss at Goldman Sachs and a fellow Democrat.

Now, the worry is that the commission will stumble in its rare turn on center stage without its star leading the way.

Gensler’s withdrawal from the investigation came despite apparently only loose ties to Corzine. The men have seen each other just a handful of times since Gensler left Goldman Sachs in 1997. Gensler did not attend Corzine’s 2010 wedding. And Corzine did not attend the funeral of Gensler’s wife, a not-

ed artist who died of breast cancer in 2006.

Gensler’s recusal puts the CFTC at a potential disadvantage as it embarks on its most high-profile investigation since its founding in 1974.

Under Gensler, the commission had begun to shed a reputation as a toothless watchdog, bringing a record number of enforcement cases while writing new rules to police Wall Street.

At the same time, the agency’s

budget is under attack on Capitol Hill and it faces questions over its handling of MF Global. Lawyers and MF Global clients have questioned why it is taking so long to recover money that should have never gone missing at all.

“There is a huge spotlight on the agency now,” said Scott Talbott, a lobbyist for the Financial Services Roundtable, a Wall Street trade group.

Gensler has been Washington’s most aggressive ambassador to

Wall Street, introducing sweeping new rules to crack down on excessive risk taking.

Even industry groups acknowledge his impact, though they are not fond of his aggressive tactics. He can be difficult, colleagues said. And his unshakeable faith in regulation has left some fearful the agency will jeopardize Wall Street’s anemic recovery and broader economic growth.

“It may be useful for Chairman Gensler in the short run to

be viewed as an opponent of the financial industry, but to be successful in the long run, the CFTC will have to produce workable regulations that do not damage the economy too much,” said Steven Lofchie, a partner at Cadwalader, Wickersham & Taft. “The jury is still out on whether the CFTC can do that.”

Wall Street scourge is an unlikely addition to the resume of Gensler, 54, a marathon runner and single father of three daughters.



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Fall 2011 Wulff Lecture

Tuesday, November 8, 2011
4:30–5:30 pm
Room 10-250
Reception immediately following

Cellular Materials in Engineering, Nature, and Medicine

Professor Lorna J. Gibson
Matoula S. Salapatas Professor of Materials Science and Engineering

Engineering honeycombs and foams, wood, plant stems and leaves, trabecular bone (a porous type of bone), and tissue engineering scaffolds all have a cellular structure that gives rise to unique properties that are exploited in engineering and in medicine. Nature, too, uses cellular materials to provide structural support as well as to conduct fluids. This talk illustrates the wide range of cellular materials and describes how they are used in engineering, nature, medicine.

The Wulff Lecture is an introductory, general-audience, entertaining lecture which serves to educate, inspire, and encourage MIT undergraduates to take up study in the field of materials science and engineering and related fields. The entire MIT community, particularly freshmen, is invited to attend. The Wulff Lecture honors the late Professor John Wulff, a skilled, provocative, and entertaining teacher who inaugurated a new approach to teaching the popular freshman subject: 3.091 Introduction to Solid State Chemistry.

Trabecular bone image courtesy of Ralph Muller

